

Midterm 2 – Potential Questions

Some basics

1. In biogeochemical terms, what is a reservoir?
2. In biogeochemical terms, what is a flux?
3. Be able to calculate the residence time of a compound in a reservoir?

What I am looking for in this exam is to see if you understand the basics of the major biogeochemical cycles we have studied. As you will note, I think you should be able to diagram the cycles. When I mean diagram, I am not looking for you to provide a quantitative picture of the magnitudes of the fluxes and receivers. I would like you to know

- what the major processes are operating are however, for instance in transporting water from the oceans to the land, evaporation plays a major role and on geologic timescales, weathering and subsequent river transport moves carbon from the land to the oceans.
- Have a qualitative idea of the relative magnitudes of the sources and sinks such as the flux carbon from the rivers to the ocean is much smaller than the exchange between the atmosphere and ocean.

If you are able to diagram the global cycles you will have gained a pretty good understanding of these global cycles.

The carbon cycle on geologic timescales

1. Be able to diagram the carbon cycle on geologic timescales (I would check out the *Scientific American Article Modeling the Geochemical Carbon Cycle*, March 1989)
2. Know the major reservoirs of carbon on Geologic timescales.
3. Know the residence times of carbon in these reservoirs.
4. Know the major mechanisms at work moving carbon from one reservoir to another.

The carbon cycle on human timescales

1. Be able to diagram the carbon cycle on human timescales. There are a couple of different versions in the handouts that I have given you.
2. Know the major reservoirs of carbon on these timescales
3. What aspects of the global carbon cycle are humans most likely to influence and why?
4. Know the difference between the mixed layer and deep ocean in terms of the reservoir size and residence time of carbon.
5. What are the two major areas on earth of deep water formation?

6. Know the relative sizes of the carbon stored in soils versus vegetation and the average residence time in these reservoirs?
7. How do human impacts affect the amount of carbon sequestered in soils and vegetation?

The methane cycle

1. Know the major sources and sinks of methane on human timescales and why methane is produced/destroyed by these sources/sinks.
2. How are humans impacting the methane cycle?
3. What is the major sink for atmospheric methane. Is the strength of this sink increasing or decreasing and why? What other gas produced by humankind may be effecting the methane cycle?

The global nitrogen and phosphorous cycles

1. Be able to diagram the global nitrogen and phosphorous cycles on human timescales.
2. Know the major human impacts on the global nitrogen and phosphorous cycles.
3. How might the carbon, nitrogen and phosphorous cycles be linked?

The global hydrologic cycle

1. Guess what, be able to diagram the global water cycle.
2. Know the major receivers in the global water cycle (this should be easy).
3. Know the amount of Fresh Water as a percentage of Total Water on Earth. Where is the majority of this freshwater stored?
4. As global temperatures increase would you expect an increase or decrease in the amount of global precipitation?
5. Has global sea level been rising or falling during the last century? What are the major causes of this rise or fall. Has the rise or fall been accelerating during the past century?

Extra Credit

What is the answer to life, the universe and everything?